



AATT RTO 24

Communications System Architecture Development

for

Air Traffic Management and Aviation Weather Information Dissemination

Advanced Air Transportation Technologies

AATT RTO 24 Team

NASA

* SAIC

ARINC

TRW

Crown Consulting





Task 1

Identification
of User Needs

Task 2

Com
System
Functional
Requirements

Task 3

Com
System
Engineering
Requirements

Task 4

Preliminary
Com System
Architecture
Concepts

Task 5

2015 AATT
Architecture

Task 6

2007 ATM
Architecture

Task 7

2007 AWIN
Architecture

Task 8

Transition

Task 9

Current Data
Links

Task 10

Com
Technology
Gaps

Task 11

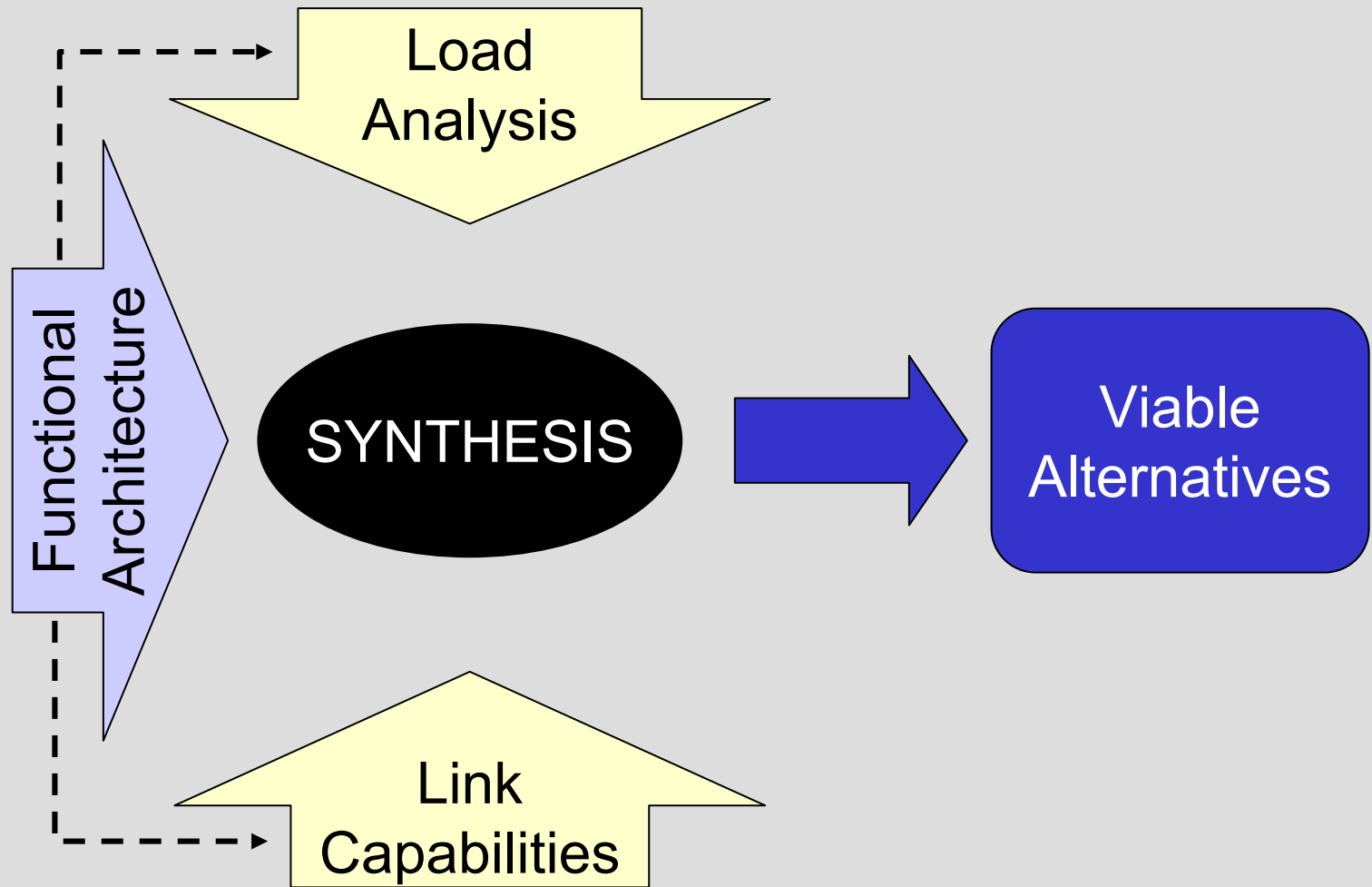
Areas for
Research and
Development

Final
Report

May 26,
2000



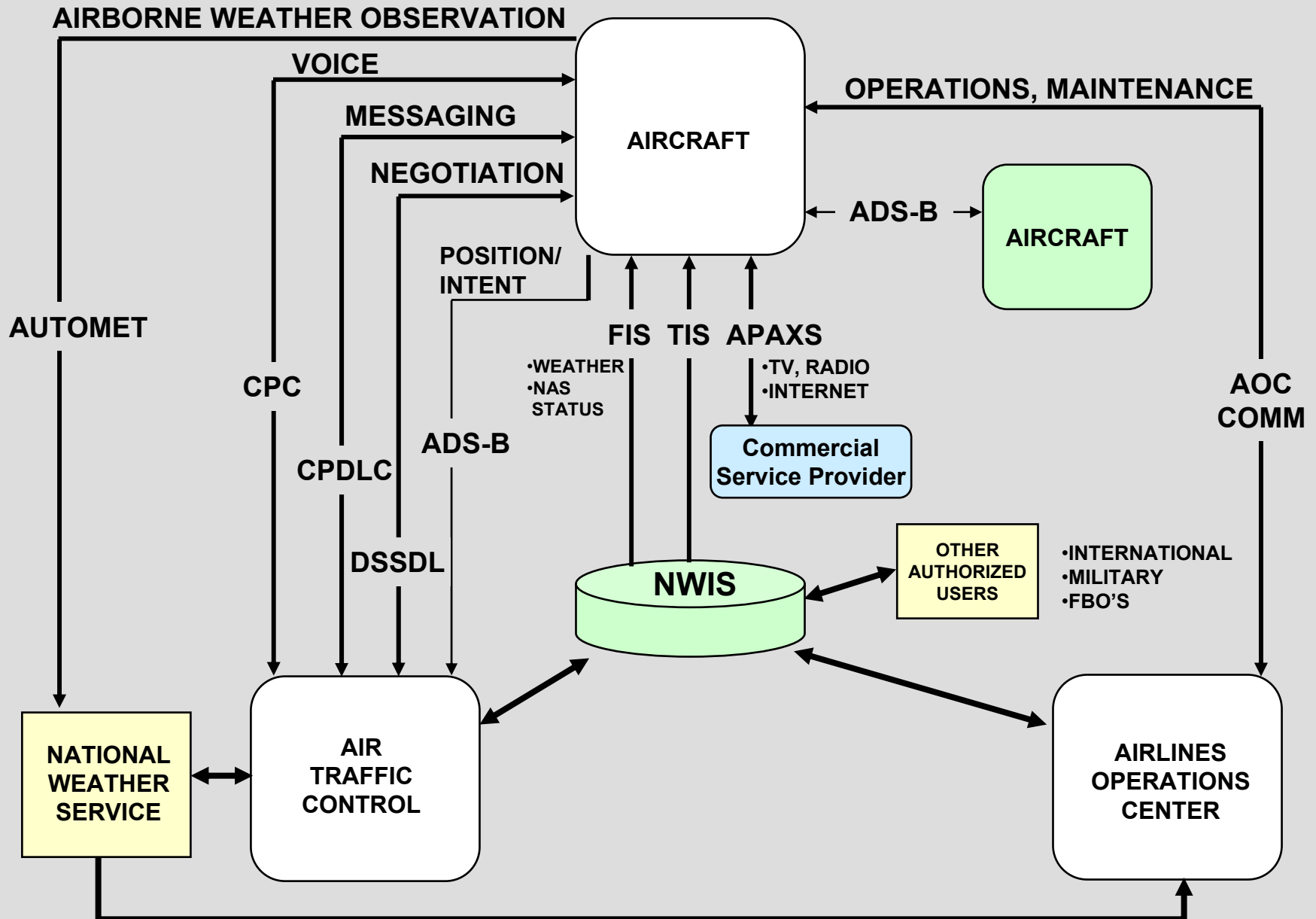
Process



Operational Concept - Tech Concept

Operational Concept	Technical Concept
Aircraft continuously receive Flight Information to enable common situational awareness	Flight Information Services (FIS)
Aircraft continuously receive Traffic Information to enable common situational awareness	Traffic Information Services (TIS)
Controller - Pilot messaging supports efficient Clearances, Flight Plan Modifications, and Advisories (including Hazardous Weather Alerts)	Controller-Pilot Data Link Communications (CPDLC)
Controller - Pilot voice communication	Controller Pilot Communications (CPC)
Aircraft exchange performance / preference data with ATC to optimize decision support	Decision Support System Data Link (DSSDL)
Aircraft continuously broadcast their position and intent to enable optimum maneuvering	Automated Dependent Surveillance-Broadcast (ADS-B)
Pilot - AOC messaging supports efficient air carrier/air transport operations and maintenance	Airline Operational Control Data Link (AOCDL)
Aircraft report airborne weather to improve weather nowcasting/forecasting	Automated Meteorological Transmission (AUTOMET)
Passengers enjoy in-flight television, radio, internet, and entertainment service	Aeronautical Passenger Services (APAXS)

Air-Ground Comm Functional Architecture

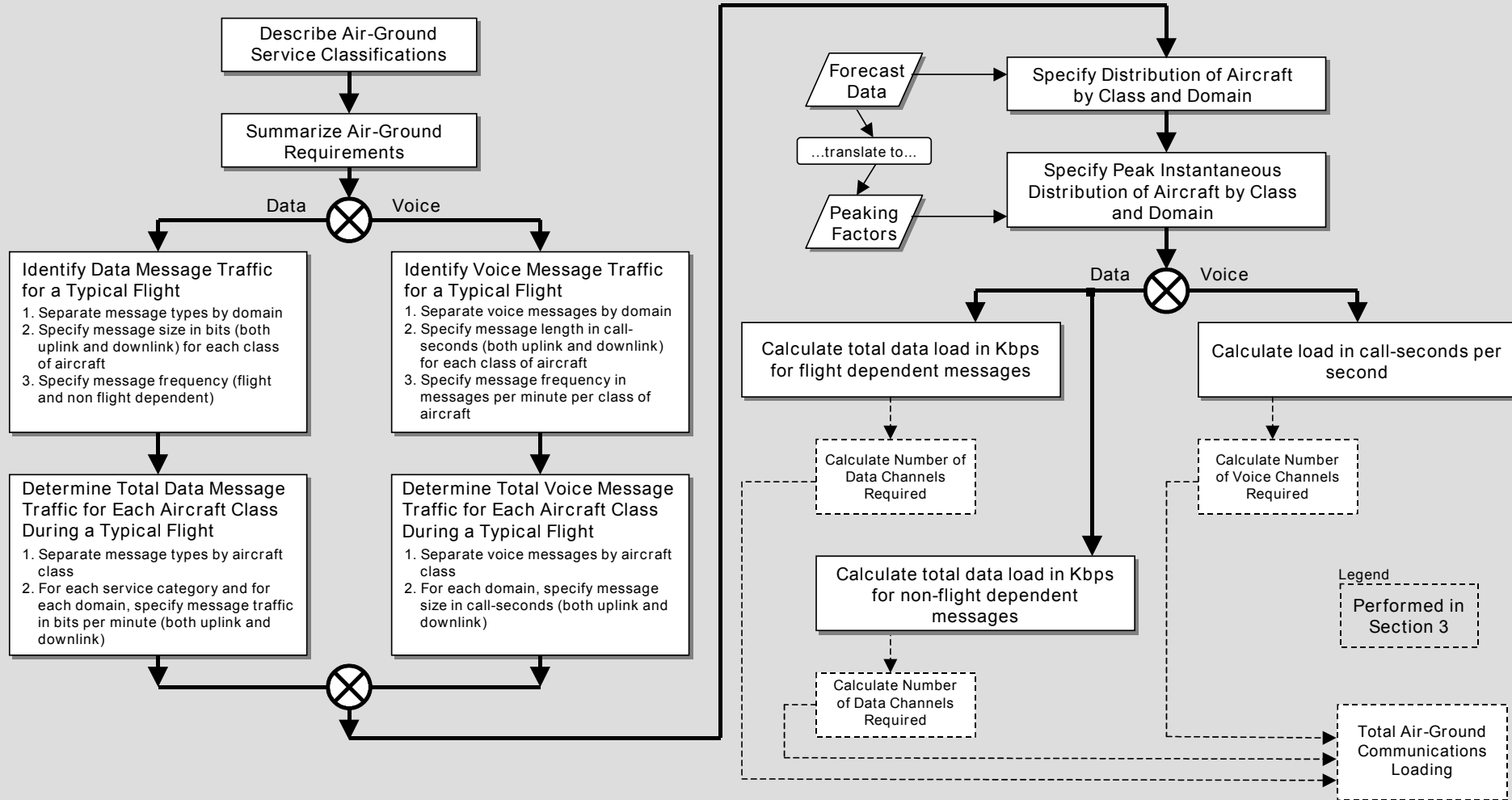


Load Analysis

- Established Data Set (Message Characteristics, performance requirements)
- Defined User Classes
- Defined Equipage Forecast
- Defined Domains
- Defined Assumptions
- Method of Calculation
- Load Analysis Results



Method of Calculation

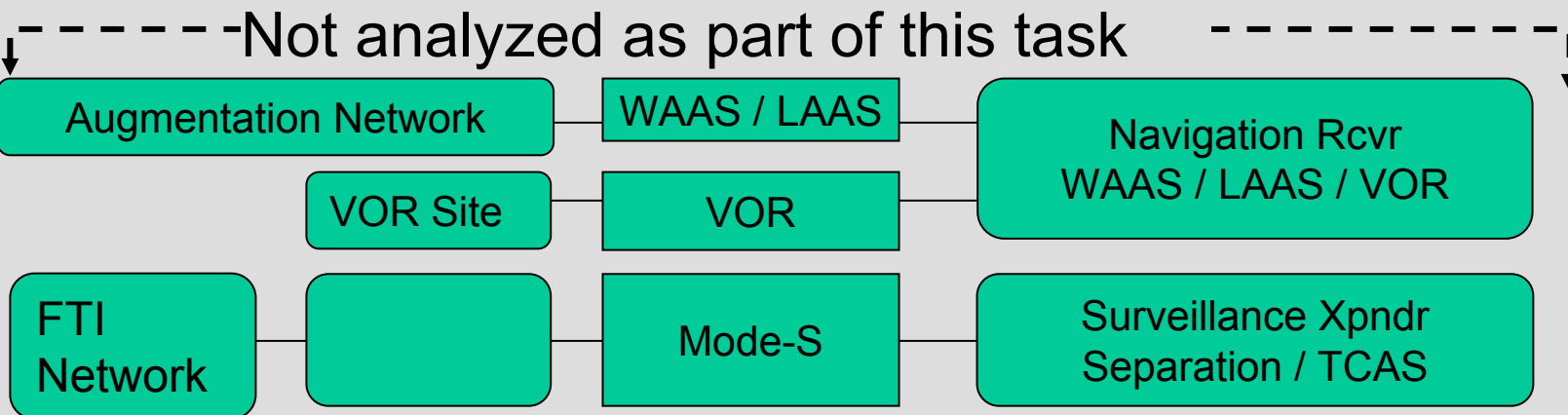
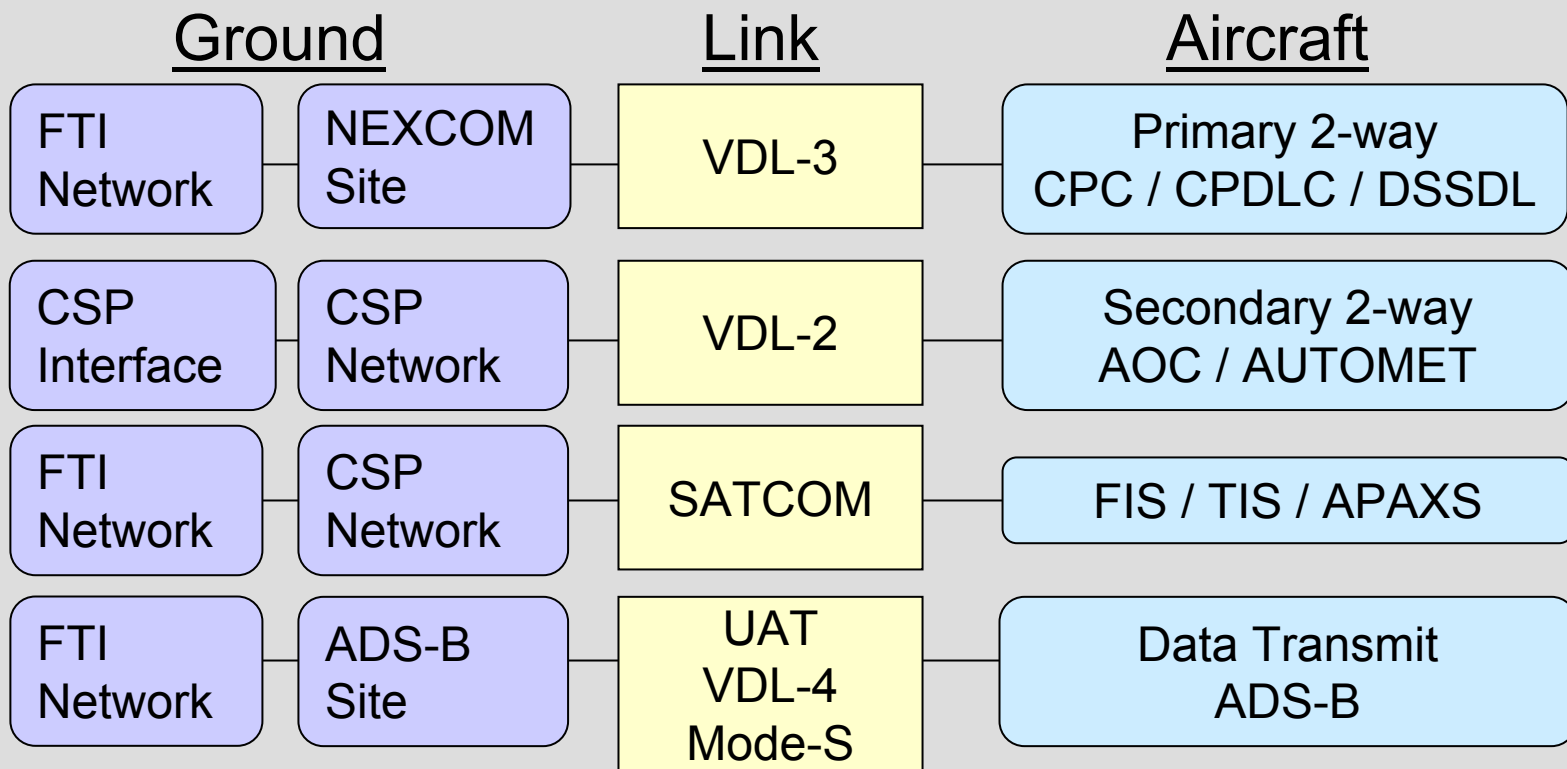


Broadband Data Considerations

- ➔ ADS-B link decision - can have major impact on Terrestrial vs Space based decision
- ➔ SATCOM implementation - driven by commercial cabin services (could lead to Class 1 Avionics cost/performance issues)

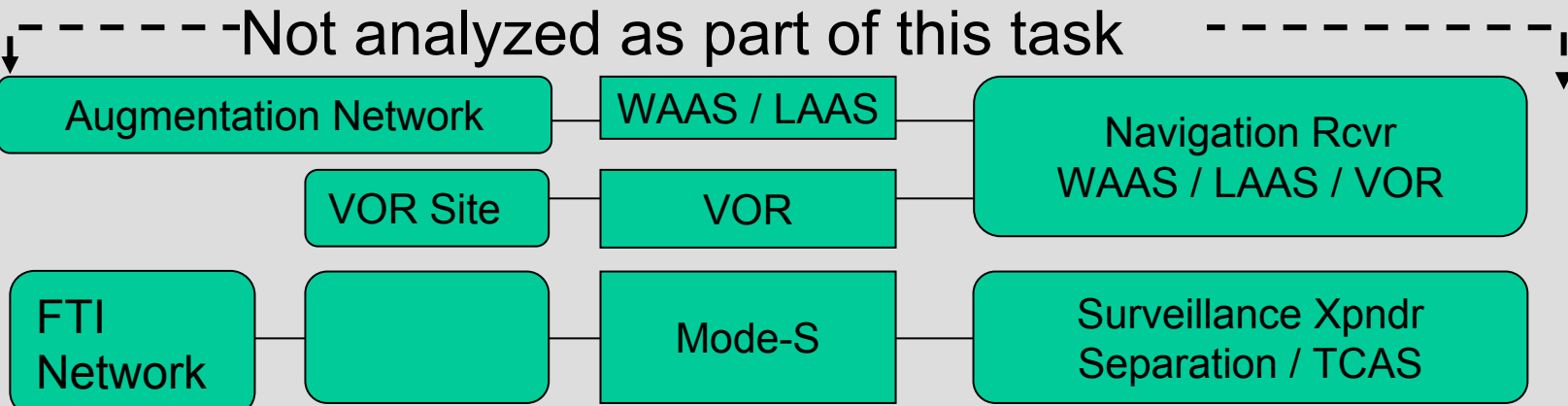
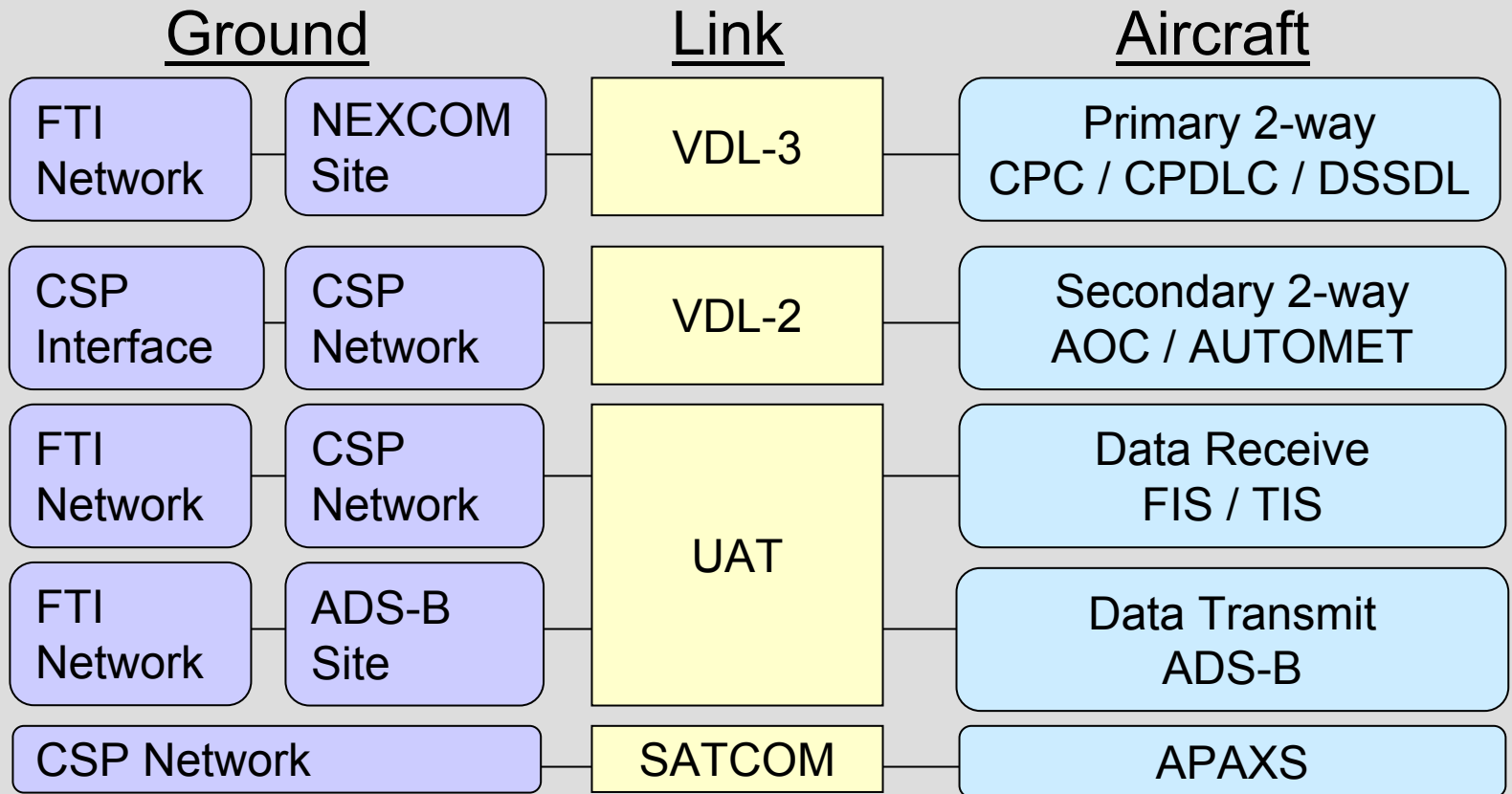


2015 Top Down Architecture - SATCOM Data





2015 Top Down Architecture - UAT Data





AATT TO 24 Challenges

- Evolving Standards, concepts, product definitions, communications technologies and services (AUTOMET, EPiRep, VDL-B, UAT, VDL -4)
- Variations and inconsistencies in documented message traffic and aircraft projections
- Pending link decisions that could impact recommendations (ADS-B)
- Concept definitions (NWIS, DAG)
- Market drivers (APAXS)



AATT TO24 Accomplishments

- Framework for future decision making
- Coherent structure for future research and analysis
- Traceability from user requirements to services
- Determined viable links for each service from a top down and bottom up perspective
- Identified key milestones for transition to 2015 AATT CSA
- Identified gap areas and solution candidates for further research

Conclusion

- ➔ An integrated broadband data link capability should be included as part of the NAS Architecture Plan
- ➔ Analysis should be expanded to incorporate Surveillance and Navigation so that the entire avionics suite can be considered
- ➔ Cost considerations should be looked at to assess the benefits of a hybrid architecture

